CLAIMS

1. Plastic tube head (2), designed to be assembled with a skirt (3) to form a tube (1), comprising a typically threaded orifice (20) and a shoulder (21) comprising an annular connection part (22) to the said skirt, characterized in that,

a) the said head (2) is formed by co-injection and comprises a thermoplastic multilayer material comprising an internal layer (24) and an external layer (23) in structure material A, and at least one inner layer (25) in barrier material B,

b) the said inner layer (25) is encased by the said internal layer (24) and external layer (23), including at the ends of the said head where the said internal and external layers are joined together in one layer, the distances "e" and "e'" between each of the ends (250, 251) of the said inner layer and the corresponding end of the said head being between 0.02 mm and 5 mm, such that the said inner layer made of a barrier material (25) extends over the greatest possible height, while its ends remain encased or encapsulated by the junction of the said internal layer (24) and external layer (23).

Sub A1

2. Head according to claim 1, in which the said internal and external layers are made of the same barrier material A, typically a polyolefine chosen from among PE and PP.

3. Head according to claim 2, in which the said barrier material B is typically chosen to be a polyvinyl alcohol or EVOH.

4. Head according to claim 3, in which the said multilayer material has at least a 3-layer "A/B/A" structure, where A and B respectively denote a layer of structure material, typically PE, and a layer of barrier material, typically EVOH, the average thickness of the layer of barrier material being between 0.02 and 0.5 mm.

Sub a2

5. Tube with a head according to anyone of claims 1 to 4.

6. Tube according to claim 5 in which the assembly of said skirt and said head is made by co-injection of the said head (2) onto the said previously formed skirt (3).

7. Manufacturing process for a tube head (2) according to any one of claims 1 to 4, in which:

Sub a3

a) into a cavity 67, formed by the cooperation of a die 61 and a punch 60 and using a co-injection head 6 supplied with structure material A and barrier material B, a flow of structure material A is co-injected for a time T = To together with, from a time T = t until a time T = To-t', a flow of barrier material corresponding to said inner layer 25, times t and t' being chosen as short as possible such that, after the injection gate 26 has been eliminated, the ends 250, 251 of the said inner barrier material layer 25 of the said head 2 are entirely encapsulated by the said structure material A of the said internal and external layers, these ends being separated from the external medium by a thickness of at least 20 µm of the said structure material A,

b) injection of the said structure material is continued for an additional time T' equal to at least

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To, in order to stabilize the quantity of injected structure material.

8. Manufacturing process according to claim 7 in which:

- To can vary from 0.1 s to 1 s
- To+T' can vary from 1 s to 3 s
- t can range from 0.01 To to 0.1 To
- t' can range from 0.02 To to 0.2 To

Sub A4

9. Process for manufacturing tubes (1) in which a head (2) is assembled on a skirt (3) according to either of claims 7 or 8, typically by welding.

10. Process according to claim 9, in which the said tube head (2) and the said skirt (3) are assembled by co-injecting said head (2) on said skirt (3).

Sub A5

11. Process according to any one of claims 7 to 10, in which n tube heads (2) are made simultaneously, where n is typically between 2 and 16, using n injection heads (6) supplied with structure material A by means of an extruder (63) for material A and a distributor (630) with n arms, and supplied with barrier material B by means of an extruder (64) for material B and a distributor (640) with n arms.

12. Manufacturing process according to either of claims 10 and 11, in which a turntable or carousel (76) with a vertical axis of rotation (77), divided into p sectors (71, 72, 73, 74) p typically being equal to 8, and indexed in rotation with an angular pitch equal to 360°/p, successively brings each sector in front of at least three fixed stations, at different angular positions with respect to the said axis of rotation, that is a first skirt loading station (71) on the said turntable sector, then a second station (72) for co-

injection and insert molding of the said heads on the said skirts, and a third section at which the tubes (74) are unloaded from the said turntable, the residence time of a sector facing each of the fixed stations being equal to the sum To+T', preferably varying from 1 second to 3 seconds, and the time interval between two fixed stations being determined particularly by the angular offset between these two fixed stations.

13. Process according to claim 12, in which, with p equal to 4, the angular offset between the co-injection station (72) and the unloading station (74) is equal to α, typically equal to 180°, such that the tube cooling time between the co-injection station and the unloading station is approximately equal to $(To+T').(p/360°).\alpha$.

Sub A6

14. Device for the manufacturing of tube heads or tubes, using the co-injection process according to any of claims 7 to 13, comprising 1 to n coinjection heads (6) according to the number n of tube heads (2) to be coinjected simultaneously in 1 to n corresponding cavities (67) in which:

a) each coinjection head (6) is supplied with structure material A and barrier material B,

b) each head comprises a ring opening (66) leading to said cavity (67), which may be supplied with material A via a channel (634), or with a ring flow of material A/B/A via opening (53) of a coinjection nozzle (5) supplied with materials A and B, and

c) each head comprises means for ensuring the programmed injection of material A or of said flow A/B/A/ into said cavity (67) at predetermined times in

Sub a cont the production cycle.

15. Device according to claim 14 in which said means for ensuring said programmed injection is typically a slide valve (65).

16. Device according to claim 15 in which said slide valve has 4 positions:

1. closing of opening (53) and channel (634): no material flow,
2. placing in communication of channel (634) and cavity (67): injection of material A into cavity (67),
3. placing in communication of opening (53) and cavity (67): injection of the ring flow of multilayer material A/B/A/,
4. placing in communication of opening (53) with the outside: optional draining of opening (53).